

75



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/704,366	11/01/2000	Thomas Fechner	3926.017	4892
7590	12/28/2004		EXAMINER	
Stephan A Pendorf Pendorf & Cutliff 5111 Memorial Highway Tampa, FL 33634-7356			LU, TOM Y	
			ART UNIT	PAPER NUMBER
			2621	

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/704,366

Applicant(s)

FECHNER ET AL.

Examiner

Tom Y Lu

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13, 14 and 16-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13, 14 and 16-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. The amendment and written response filed on July 26, 2004 has been entered.
2. Claims 12 and 15 have been canceled.
3. Claims 1-11, 13-14 and 16-24 have been amended.
4. Claims 1-11, 13-14 and 16-24 are pending.

### ***Drawings***

5. The drawings were received on July 26, 2004. These drawings are figures 1-4.

### ***Response to Arguments***

#### ***35 USC § 112***

6. Applicant's arguments, see Remarks, pages 9-10, filed on July 26, 2004, with respect to Claims 1-24 have been fully considered and are persuasive. The rejection of 35 U.S.C. 112, 2<sup>nd</sup> Paragraph has been withdrawn.

#### ***35 USC § 102***

7. Applicant's arguments, see Remarks, filed on July 26, 2004, with respect to the rejection(s) of claim(s) 12 and 15 under 35 U.S.C. 102 (b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kakinami et al (U.S. Patent No. 6,205,234 B1).

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Art Unit: 2621

8. Claims 2-11, 17-18 and 21-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- a. Referring to Claim 2, the examiner is not clear whether to consider the limitation in the parenthesis as a part of the claim. Correction is advised. In addition,
- b. Claims 3-9 are rejected as being dependent upon Claim 2.
- c. Claim 10 is rejected for the same reason given in Claim 2.
- d. Claim 11 is rejected as being dependent upon Claim 2.
- e. With regard to Claim 17, see explanation in Claim 2.
- f. Claim 18 is rejected as being dependent upon Claim 17.
- g. Claim 19 is rejected for the same reason given in Claim 2.
- h. Claim 21 is rejected for the same reason given in Claim 2.
- i. Claims 22-23 are rejected as being dependent upon Claim 21.
- j. Claim 24 is rejected for the same reason given in Claim 2.

9. Regarding claims 3, 5 and 21 the phrase "and/or" renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "or "), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d).

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

Art Unit: 2621

international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1-6, 9-11, 13-14 and 15-18 and 20-22 rejected under 35 U.S.C. 102(e) as being anticipated by Kakinami et al (U.S. Patent No. 6,205,234 B1).

- a. Referring to Claim 1, Kakinami discloses evaluating morphological characteristics of vehicle lane markings (see figure 1, output d, Kakinami teaches evaluating morphological characteristics of vehicle lane marking) using a priori knowledge (the parameters at column 6, lines 31-38, are the claimed "priori knowledge"); and using a matched-filter (window setting unit in figure 1 is the claimed "matched filter") in order to extract image points (window setting unit performs function of setting window for object step 103 in figure 5 to extract edge points, "image points"), which are associated with vehicle lane markers (the edge points are associated with vehicle lane markers), by measuring the average gray value of the background in the environment of the position to be examined (see figure 7, the flat line segments in the differential value plot represent the average gray value of the background in the environment of the position to be examined), and evaluating an image point (see figure 7, the peaks are the claimed "image points", which is potentially to be associated with the vehicle lane markings), which is potentially to be associated with the vehicle lane marking, on the basis of comparison between background noise, the average gray value in the environment, and a gray value of the position to be examined (the "peaks" shown in figure 7 are determined to be lane markers after the mathematical model in step 107, and the peaks are determined based on the comparison of between the

background noise and the a gray value of the position to b examined, and the position is the position of the peak point).

- b. Referring to Claim 2, Kakinami discloses wherein the image data, areas are extracted for processing, in which vehicle lane markings are contained with high probability based upon a priori knowledge (based on the application of mathematical model with parameters, the window setting unit extracts the area of interest with high probability).
- c. Referring to Claim 3, Kakinami discloses wherein the a priori knowledge is based upon camera geometry and or geometry of the vehicle track and/or dimensions of the vehicle lane markings and/or vehicle position (column 6, lines 31-38).
- d. Referring to Claim 4, Kakinami discloses wherein in initialization of the process for recognition of vehicle lane markings model parameters area varied at random sequence so long until vehicle lane markings are found (the mathematical model is the claimed "vehicle markings model", and for every lane marking detecting system, initial calibration is needed to detect the vehicle lane markings).
- e. Referring to Claim 5, Kakinami discloses wherein the model parameter draws upon the width of the vehicle lane and/or orientation of the camera with respect to the center of the vehicle lane and/or the yaw angle of the vehicle (column 6, line 32).
- f. Referring to Claim 6, Kakinami discloses wherein for repositioning of already initialized ROI parameter predictions, a vehicle street model based on a prediction

of a evaluation process is drawn upon for parameter determination (column 6, lines 39-58).

- g. Referring to Claim 9, Kakinami discloses wherein the ROI is limited vertically on the basis of a minimal and a maximal distance in the street plane (the vertical limits are between 0 to 479, see column 6, line 46).
- h. Referring to Claim 10, wherein in particular in application of the process at night, the vertical limitation of the ROI is determined by the area of the maximal illumination (column 4, lines 56-58, the visible region is the claimed "ROI", which at night would be the area of maximal illumination).
- i. Referring to Claim 11, Kakinami discloses wherein the limitation is controlled by the number of the image points expected to be associated with the vehicle lane marker, and this control or regulation is optimal when the number of the image points to be expected is constant for all distance ranges (the number of the images points to be expected is constant from 0-479).
- j. Referring to Claim 13, Kakinami discloses wherein the matched-filtered is adapted in shape and size to the vehicle lane marking being searched for and/or to the statistic of the background (column 6, lines 31-32).
- k. Referring to Claim 14, Kakinami discloses wherein the matched-filter is implemented in separate form, in which x-y components are presented separately (see figure 4).

- l. Referring to Claim 16, Kakinami discloses wherein in the evaluation of the matched-filter, only the x-component is evaluated (see figure 2, only x coordinates are stored).
- m. Referring to Claim 17, Kakinami discloses wherein the after the extraction of the image points, which are to be associated with vehicle lane markings, these are digitized, wherein the intensities of the individual pixels are compared with a threshold value, and the pixels are only then drawn upon for further evaluation when their intensity exceeds this threshold (column 6, lines 1-19).
- n. Referring to Claim 18, Kakinami discloses wherein the threshold value is determined from background noise using a threshold value regulator or controller (even through a threshold value regulator is not specified in Kakinami, however, it is an inherently feature in the system to get obtained a predetermined threshold as shown in figure 7, which clearly shows the thresholds in edge zones z1 and z2 are determined based on comparison between the background noise and the peak value).
- o. Referring to Claim 20, Kakinami discloses wherein after the extraction of image points potentially belonging to a vehicle lane marker and subsequent digitization, these image points are collected for he further processing into marker objects (see figure 5, the edge points are collected for further processing).
- p. Referring to Claim 21, Kakinami discloses wherein in the evaluation of the morphological characteristics of the vehicle lane marker, the size of the marking object and/or the roundness of the pixel group and/or the distribution of the pixels,



the number of empty spaces within the pixel group is evaluated with respect to whether they satisfied criteria of a vehicle lane marker defined in accordance with a priori knowledge (see column 6, lines 39-58, y is the size of the marking object).

- q. Referring to Claim 22, Kakinami discloses wherein each pixel group, which satisfies the criteria of a vehicle lane marker, is considered to be an actual marker object and is characterized by its image coordinates (column 6, lines 39-58).
- r. Referring to Claim 23, Kakinami discloses wherein as characterizing image coordinates, the coordinates of the center of gravity of the pixel group associated with the marking object is selected (column 6, line 67).
- s. Referring to Claim 24, Kakinami discloses wherein the characteristic image coordinates of the marking object are employed in order with curve regression to describe the boundaries of the own vehicle lane with respect to the course of the vehicle track, as well as to describe the own position with respect to the vehicle lane center, and that this description is provided to an estimation process for parameter determination for repositioning of the ROI within the image data (column 6, lines 39-67).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

- 11. Claim 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kakinami et al.

- a. Referring to Claim 7, Kakinami does not explicitly disclose wherein the evaluation process for parameter determination is based upon a Kalman-filter. However, a person of ordinary skill in the art would have been motivated to do so because the purpose of a Kalman-filter is to provide a recursive solution to discrete linear filter problems, which Kakinami's parameters are based upon the shape of the lane, which changes accordingly, and subjected to iteration process, column 6, line 38.
- b. Referring to Claim 8, Kakinami discloses wherein the repositioning of the ROI, its values are controlled by variation of the result values of the prediction of the Kalman-filter, when the width is adapted proportionally to the size of the variation of the results (column 6, lines 35-67).

***Allowable Subject Matter***

12. Claim 19 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

***Conclusion***

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Hashima et al, U.S. Patent No. 6,115,505, see columns 7-9.
- b. Yasui et al, U.S. Patent No. 6,493,458 B2, see columns 6-8.
- c. Nakayama et al, U.S. Patent No. 5,359,666, see columns 5-7.

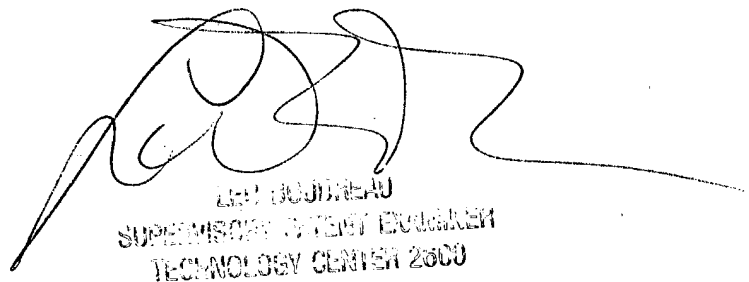
Art Unit: 2621

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Y Lu whose telephone number is (703) 306-4057. The examiner can normally be reached on 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Y. Lu



LEO H BODREAU  
SUPERVISOR, PATENT EXAMINER  
TECHNOLOGY CENTER 2600